# Michigan Department of Natural Resources Fisheries Division Research Theme Assessment
# Human Dimensions of Aquatics and Fisheries Management

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**Sections:**



## I. Top Three Human Dimension Research Objectives:

**1. *Improve knowledge of the human component (who, what, where and why) of aquatic ecosystems*.**
**2. *Develop methods for incorporating opinions/values of a diverse constituency into Fisheries decision processes*.**
**3. *Identify outreach programs that effectively foster aquatic resource stewardship*.**

Descriptions of Top Three Research Objectives:

**1. *Improve knowledge of the human component (who, what, where and why) of aquatic ecosystems*.**
As a Division, we know a lot about fish, but very little about the people that interact with aquatic ecosystems. We know how much time anglers spend fishing and what they catch

(via creel surveys), but we know very little about human demographics, behavior, attitudes, and economic roles. The best type of research in this area would include:

- Development and application of new unbiased methods (or use of existing data collection systems such as fishing license databases and creel surveys) for collecting data on the composition of anglers in Michigan.

- Development and application of new unbiased methods (or use of existing data collection systems such as fishing license databases and creel surveys) for collecting data on angler attitudes, preferences and behavior.

- Research that describes relationships between management actions and angler behavior.

- Improving accuracy and interpretation of creel and charter catch statistics so their application can be expanded (e.g. population indices in areas that lack surveys).

- Identifying attitudes and preferences of the general public (including anglers) in regard to ecosystem management in inland and Great Lakes waters.

- Economic valuation of recreational and commercial aquatic resource users.

- Continuation of angler effort and catch surveys to meet legal mandates and statewide research and management objectives.

**2. *Develop methods for incorporating opinions/values of a diverse constituency into Fisheries decision processes*.**
There is some overlap of this priority with GLFC objectives 1 and 3 (Section VII).

- Studies that assess public attitudes about aquatic resource management (e.g. dam removals, rehabilitation/restoration, etc.), including public valuation of management plans.

- Development and application of methodology that identifies and involves non-consumptive resource users.

- Development of models that appropriately "weight" views of diverse and potentially conflicting groups.

- Development and application of public opinion data to risk assessment and decision analyses.

- Development of methodology for building and managing relationships between Fisheries Division and the public (angling and non-angling) (e.g. community resource management, social capacity building, etc.).

- Research that evaluates and develops improved processes for decision-making within the Division, among MDNR Divisions, and with other agencies,

**3.** ***Identify outreach programs that effectively foster aquatic resource stewardship*****.** This priority area overlaps with priority 1 and 2 because some of the information gathered in priority #1 (human attitudes) and priority #2 (methods for assessing non-consumptive users) can be applied to this research objective:

- Continuation of research that identifies human attributes and agency actions promoting aquatic resource stewardship.

- Research that identifies how constituent groups use diverse forms of knowledge (e.g. science, cultural values, etc.) as they evaluate their support for management objectives.

- Understanding the relationship between youth and aquatic resources.

## II. Methodology for Identifying Top Priorities:

One method for selecting top research objectives is to develop a list of research topics, set criteria for ranking, and rank the topics using the criteria. We did not do this directly, but kept many important criteria (e.g. widespread application, relevance to management, etc.) in mind when we discussed the research topics.

Instead, we focused on a conceptual model that described how human dimension information is used when MDNR Fisheries Division sets objectives (Figures 1 and 2) and used this model to identify the most critical gaps in knowledge. This approach helped us develop a comprehensive list of human dimension research that could improve the function and goals of the Division.

We were also asked to identify the top research areas within a landscape paradigm. This was not difficult to do in human dimensions research because humans are components of the ecosystem in every place where fisheries impact people and people impact fisheries. Nonetheless, some research can narrowly focus on a specific area and/or a specific relationship between people and the resource; therefore, we focused on priorities that had the greatest application across many ecosystem types.

## III. Historical Approaches

Fish Division surveys:

- State-wide on-site creel surveys: Were conducted by conservation officers (1920s-1960s) and were limited to interviews only, with no statistical design.

- Statistically designed state-wide on-site creel surveys: Over 400 short-term on-site creel surveys were conducted on inland waters (See Lockwood 2000 for a review of those conducted 1993-99). Twenty years of continuous Great Lakes creel surveys (1985-present) were conducted at most Great Lakes locations (Rakoczy and Svoboda 1997). The inland and Great Lakes creel survey objective was to collect data to estimate angler effort and catch, which still remains a priority. Social data was limited to zip codes for both inland and Great Lakes and age/gender data from inland surveys. Surveys were not designed to obtain unbiased data on angler composition, beliefs or values.

- Mail surveys, 1967-1984, to collect catch and effort data: These surveys were first used in 1967 to assess the first season of adult Pacific salmon on the Great Lakes and expanded to all sport-fish by 1970. Additional questions were added in 1983-84 to identify market segment and economic impacts. Mail surveys were abandoned in 1984 due to catch and effort bias.

- Coolwater fishing regulation review: A public review workshop was held by the Michigan Department of Natural Resources, Fisheries Division resulting in an internal document (MDNR 1993).

- Black Bass regulation review: A public black bass review and angler opinion survey was held by the Michigan Department of Natural Resources, Fisheries Division resulting in an internal document (Black Bass Committee 2005).

Fish Division studies:

- Bence, J., Hall, D.A. and M.H. Koval. 2004. Comparison of mail and creel survey estimates for recreational fishing on the Great Lakes. Federal Aid Study 230489 Final Report. Michigan Department of Natural Resources.

- Dann, S. and B. Schroeder. 2005. Fisheries stewardship and heritage outreach/research (SHOR) initiative: a five year plan for baseline and longitudinal research on angling involvement and associated fisheries and aquatic stewardship activities in Michigan; angler recruitment and retention, 1995-present. Federal Aid Study 230646, Michigan Department of Natural Resources.

- Lupi, F. 2005. A profile of Michigan anglers: preferences, market segments and expenditures. Federal Aid Study 230690, Michigan Department of Natural Resources.

Other agency studies:

- U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, U.S. Census bureau. 2001. National survey of Fishing, Hunting, and Wildlife-Associated Recreation.

- Sport Fishing Institute. 1991. Sport fishing in the Great Lakes: Who to contact, economics, participation. Washington, DC.

A selection of primary literature:

- Beard Jr., D.B., Hewett, S.W., Yang, Q., King, R.M. and S.J. Gilbert. 1997. Prediction of angler catch rates based on walleye population density.

- Beard Jr., T.D. and T. E. Essingtion. 2000. Effects of angling and life history processes on bluegill size structure: Insights from an individual-based model. Transactions of the American Fisheries Society. 129(2): 561-568.

- Beard Jr., T.D., Rasmussen, P.W., Cox, S. and S.R. Carpenter. 2003. Evaluation of a management system for a mixed walleye spearing and angling fishery in Northern Wisconsin.

- Beard Jr., T.D., Cox, S.P. and S.R. Carpenter. 2003. Impacts of daily bag limit reductions on angler effort in Wisconsin walleye lakes. North American Journal of Fisheries Management. 23(4): 1283-1293.

- Carl, L.M. 1977. Attitudes and behavior of anglers fishing for salmon on Michigan streams. MDNR Fisheries Research Report No. 1848. Ann Arbor, Michigan.

- Carl, L.M. 1982. Social impacts of a stream reclamation project on urban anglers. North American Journal of Fisheries Management. 2:164-170.

- Fayram, A.H., Hewett, S.W., Gilbert, S.J., Plaster, S.D., and T. D. Beard Jr. 2001. Evaluation of a 15-inch minimum length limit for walleye angling in Northern Wiscosin. North American Journal of Fisheries Management. 21(4): 816-824.

- Hansen, M.J., T.D. Beard Jr. and S.W. Hewett. 2000. Catch rates and catchability of walleyes in angling and spearing fisheries in Northern Wisconsin Lakes.

- McFadden et al. 1969. A survey of some opinions of Michigan sport fishermen. Transaction of the American Fisheries Society 93:183-193.

- Ostaszewski, A. 1990. A catch-and release fishery for stocked adult trout in the Huron River, Proud Lake Recreation Area, Oakland County, Michigan. MDNR Fisheries Research Report No. 1980.

  *Comparison of 1975 and 1987 creel surveys in an area annually stocked with rainbow trout since 1974 showed anglers to have a higher CPUE with a*

*benefit/cost ratio of 20.2:1, double of that in 1975. Increases attributed to high occurrence of catch and release. Study demonstrated value and economic benefit of this management action.*

- Vanderpool, C.K. 1987. Social impact assessment and fisheries. Transactions of the Amercian Fisheries Society. 115:479-485

## IV. Current Fisheries Division Human Dimension Research

- Federal Aid Study 230427: Great lake creel survey; Sarah Thayer (MDNR-Charlevoix).

- Federal Aid Study 230462: Charter boat catch and effort; Sarah Thayer (MDNR-Charlevoix).

- Federal Aid Study 230646: Inland creel survey; Zhenming Su (MDNR-Ann Arbor).

- Federal Aid Study 230690: Develop economic models; Frank Lupi (MSU-PERM).

- Federal Aid Study 230697: Fisheries stewardship and heritage outreach/research (SHOR) initiative; Shari Dann (MSU).

- New federal aid study: Evaluation of Michigan's inland fish stocking program and optimizing allocation of stocking resources by a systems analysis. Zhenming Su, Kevin Wehrly, Gary Whelan and Todd Grischke.

  *State-wide level analysis of stocking success, for which success will be measured by a variety of factors that include a human dimension measure of angler satisfaction.*

- Great Lakes Fishery Commission Study, 2005-2006. Collecting angler behavior data from Great Lakes creel surveys. Lupi, F, Thayer, S.A. and K Wallmo.

## V. Areas of Emphasis Research Needs:

Recreational Fisheries Key Result Areas (KRAs):

**KRA = Angler recruitment and aquatic research education**

Objective: Conduct and encourage outreach programs and designed to recruit new anglers and foster aquatic stewardship.
Task: Hire the staff listed in the Fish Division Staffing Plan for the Fisheries Outreach and Aquatic Education Unit (FO&AEU).
Committee Comments (annotated): Directly linked to following KRA. Four additional positions listed for this area. First hired individual should focus exclusively on coordinating the analyses on angler behavior, preferences and

economic impacts. Gathering of data prior to creation of this position could help structure this unit.

**KRA = Market and economic analysis**

Objective: Help guide management of fishery resources and possibly help Fish Division Management Team decide how to structure the FO&AEU.

Task: Coordinate a science-based, state-wide social marketing and economic analysis of Mich public (anglers and non-anglers) to assess human behavior regarding present angling activity, preferences, barriers to increased angling, and determine needs/strategy to change behavior toward more angling.

Committee Comments (annotated): To reverse the downward trend in license sales and increase angler participation/retention, we need to understand what anglers and non-anglers need/value/prefer for continuous management of fishery resources. Preliminary study results could be used to structure/identify skills of a new Fisheries FO&AEU position.

## VI. Related Research Needs by other Agencies

Great Lake Fisheries Commission Research Theme Areas (Dobson et al. 2003):

1. **Decision-making and the role of human dimensions information.**

Key Research Questions:

What human dimensions information is used in management and what are the impediments for more effective decision processes?

What are the key human dimension data needed?

How can these data be integrated with resource management decisions?

Are changes occurring to human dimensions of Great Lakes fishery management and why?

2. **Research into Organizational Structure and Behavior-**

Key Research Questions:

What are the overlaps, gaps and conflicts in legal mandates of the Great Lakes fishery agencies?

How is the common pool natural resources of the Great Lakes best managed?

How have institutions evolved to be more or less effective in Great Lakes fishery management?

3. **Research into Stakeholder Involvement in Fishery Management/Development of Communication Networks (fishery managers, researchers and stakeholders).**

Key Research Questions:

Who are the stakeholders that should be involved?

In what ways are stakeholders currently involved?

Do stakeholders desire involvement, and what level of involvement is appropriate?

Would increased stakeholder involvement improve management decisions or create more sustainable decisions?

How could stakeholder involvement be enhanced?
How do managers perceive and use stakeholder involvement?

## VII. Prioritized Research Gaps

*Please refer to Section I. for final research priorities.

1. Base-line data on the composition of anglers (fish targets, locations, human demography) in the entire State of Michigan (Inland and Great Lakes).
2. Understanding how the public interacts with the ecosystem (motivations, preferences, resultant activity), including the relationship between anglers and management actions.
3. Improved accuracy and use of current angler effort and catch databases.
4. Understanding angler attitudes (beliefs + values).
5. Understanding relationships between resource users and the economy/society.
6. Methods and evaluations of collaboration/coordination efforts with constituents.
7. Methods for promoting greater aquatic resource stewardship.
8. Cost/benefit analyses (that include angler benefits) of management actions.
9. Current economic valuations of fisheries, including commercial fisheries and non-angling activities (e.g. fish viewing).

## VIII. Broad Approaches to Address Gaps

*See detailed descriptions of top three priorities (Section I) for final suggested approaches.

- Increased use of existing surveys to collect additional social data (e.g. Collecting angler behavior data from Great Lakes creel surveys, Lupi, F., Thayer, S., and K.Walmo, Study, 2005-2006).
- Addition of mail or point-of-sale license surveys to collect data on the composition of anglers, over more than one year, if possible.
- Periodic surveys of "fishery user" beliefs and values.
- Periodic surveys of all Michigan residents (anglers and non-anglers), of ecosystem beliefs and values.
- Improvements in collection, evaluation and application of creel and charter data.
- Use of existing creel databases to model angler behavior.

## IX. Fish Division Benefits

The following describes the benefits from two types of research:

1. **Base-line data on the composition of anglers (fish targets, locations, human demography) in the entire State of Michigan (Inland and Great Lakes).** Voiland and Duttweiler (1984) stress the need to develop a better understanding of fishery resource users for purposes of better management. This is a necessary prerequisite to collecting additional human dimension information and conducting additional studies. The results will have large-scale application across numerous current and future Fisheries Division programs. Results can help prioritize management and research objectives and later provide quantitative support for objectives. Human dimension studies can promote better public relations. The cost of additional survey work will likely not exceed the benefits obtained.

2. **Understanding angler attitudes (beliefs + values), behavior (motivations, preferences, activity) and the ecological, economic and social impacts of that behavior.** Many of these data can be obtained from an expansion of the base-line survey described above. Other (e.g. behavior) could possibly be extracted from current creel data or gathered through additional studies. An example of application of these data: Fishing regulation committees can use the data to recommend regulations that are best for Michigan's aquatic resources if they understand how angler attitudes lead to certain types of fishing behavior and how that behavior affects economics and society.

## X. Additional References


Dobson, T.A., S.J. Filey and M Gaden. 2003. Human dimensions of Great Lakes fisheries management. Great Lakes Fishery Commission.

Lockwood, R.N. 2000. Sportfishing angler surveys on Michigan inland waters, 1993-99. MDNR Fisheries Division Technical Report No. 2000-3.

Rakoczy, G.P. and R.F. Svoboda. 1997. Sportfishing Catch and Effort from the Michigan Waters of Lakes Michigan, Huron, Erie, and Superior, April1, 1994-March 31, 1995. MDNR Fisheries Division Technical Report no. 97-4.

Riley, S.J., D.J. Decker, L.H. Carpenter, J.F. Organ, W.F. Siemer, G.F. Mattefld and G. Parsons. 2002. The essence of wildlife management. Wildlife Society Bulletin 30(2).

Voiland, M.P. and M.W. Duttweiler. 1984. Where's the humanity: a challenge and opportunity for the fisheries community. Fisheries 9(4):10-12.


Figure 1. Goal/objective model for Michigan Department of Natural Resources Fisheries Division. Bold italics represent areas of potential human dimension research.

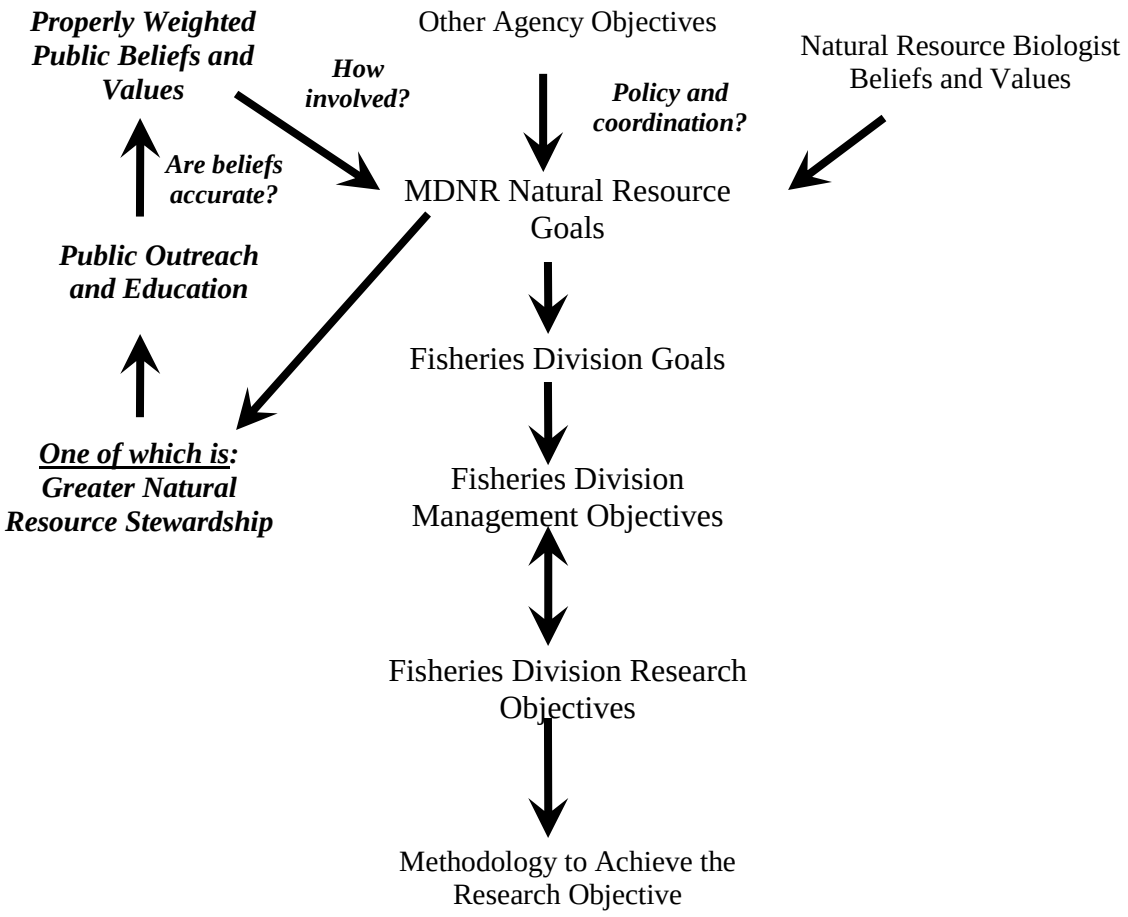
Properly Weighted Public Beliefs and Values
How involved?
Other Agency Objectives
Policy and coordination?
Natural Resource Biologist Beliefs and Values
Are beliefs accurate?
MDNR Natural Resource Goals
Public Outreach and Education
Fisheries Division Goals
One of which is: Greater Natural Resource Stewardship
Fisheries Division Management Objectives
Fisheries Division Research Objectives
Methodology to Achieve the Research Objective

Figure 2. Relationship between MDNR Fisheries Division research and management highlighting the human dimension components. Bold italics represent areas of potential human dimension research.